

Proposed changes to Portland Harbor Superfund

Background

The Oregon State University Superfund Research Program studies polycyclic aromatic hydrocarbons at Superfund sites. We prepared this fact sheet to clarify the proposed changes to Portland Harbor.

The United States Environmental Protection Agency (EPA) evaluates the toxicity of chemicals through a standard process. In January of 2017, based on current research, benzo[a]pyrene (BaP) was updated and is now considered to be 7 times less toxic for humans through ingestion and skin contact than previously thought. For Portland Harbor, the risk assessment considered risk for both adults and children. The new value is considered protective of human health.



What is Benzo[a]pyrene?

BaP is a polycyclic aromatic hydrocarbon (PAH). PAHs are pollutants found in the air, water, soil and food. The primary source of PAHs is from burning carbon-containing compounds, such as wood, petroleum and fuel. They are also found in gasoline and diesel exhaust, soot and cigar / cigarette smoke.

BaP is a carcinogen. This means that continued, high exposure increases cancer risk. The EPA update also includes a non-cancer risk factor.

What does this mean?

The change in benzo[a]pyrene toxicity may impact the planned clean-up of the Portland Harbor Superfund site. In addition to changing the toxicity of BaP, the change will affect six additional carcinogenic PAHs, for a total of 7 PAH toxicity values changed.

BaP is used as a standard for 6 other carcinogenic PAHs.

How it works: BaP is assigned a factor of 1. The other 6 PAHs are assigned a value relative to BaP. This value shows if they are considered more or less carcinogenic than BaP. This graph shows the relative potency of these 7 PAHs at current levels (dark blue bars), and at the proposed new levels (light blue bars)

OSU Research on BaP and potency factors

Mechanism-based classification of PAH mixtures to predict carcinogenic potential. By S. Tilton et. al. 2015. *Toxicological Sciences* 146(1): 135-145. Results indicate that using BaP to evaluate carcinogenicity of other PAHs is insufficient.

Polycyclic aromatic hydrocarbons as skin carcinogens: Comparison of benzo[a]pyrene, dibenzo[def,p]chrysene and three environmental mixtures in the FVB/N mouse. By L. Siddens et al. 2012. *Toxicology and Applied Pharmacology*. 264(3): 377-386. This study showed that the carcinogenicity of DBC and two of the mixtures was greater than would have been predicted using published Relative Potency Factors.

Want the papers? Contact us: diana.rohlman@oregonstate.edu

What changes?

- ~\$35 million saved
- ~17 fewer acres remediated
- Reduced toxicity values for 7 carcinogenic PAHs
- Other PAHs unchanged

PAHs can be man-made and can occur naturally.



Petroleum & Coal



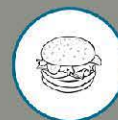
Gasoline



Vehicle exhaust
(Diesel & Gas)



Smoke



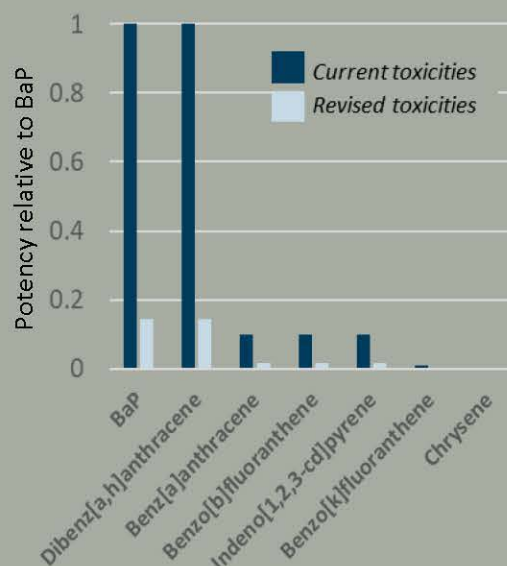
Grilled, BBQ food



Cigarettes and
e-cigarettes

Common Sources of PAHs

Old vs New toxicity values



Values based off published 1993 EPA document:

<https://www.epa.gov/sites/production/files/2015-11/documents/pah-rpfs.pdf>